

CLAIMS

1. A method of forming a microelectromechanical system (MEMS) device comprising:
 - forming mechanical structures supported by a substrate having a bond ring area laterally spaced from the mechanical structures and having a sacrificial layer encapsulating the mechanical structures;
 - forming a bond ring material on top of the sacrificial layer and the bond ring area; and
 - removing some of the bond ring material to create a bond ring.
2. The method of claim 1 wherein the sacrificial layer comprises photo resist.
3. The method of claim 1 wherein the sacrificial layer comprises silicon dioxide.
4. The method of claim 1 wherein the sacrificial layer comprises amorphous silicon.
5. The method of claim 1 wherein the sacrificial layer comprises a sacrificial layer having sufficient etch selectivity to not significantly adversely affect the mechanical structures when removed.
6. The method of claim 1 wherein the bond ring material comprises gold.
7. The method of claim 1 and further comprising removing the sacrificial layer after removing the bond ring material.
8. The method of claim 1 and further comprising forming an eutectic bond with the remaining bond ring material.

9. A method of forming a microelectromechanical system (MEMS) device comprising:

forming mechanical structures supported by a substrate and having a sacrificial layer encapsulating the mechanical structures;

forming a bond ring area laterally spaced from the mechanical structures and supported by the substrate, the bond ring area having a portion without the sacrificial layer thereon;

forming a conductive layer on top of the sacrificial layer and the bond ring area;

removing some of the conductive layer such that the conductive layer remains in the portion of the bond ring area; and

removing the sacrificial layer to release the mechanical structures.

10. The method of claim 9 wherein the sacrificial layer comprises a sacrificial layer having sufficient etch selectivity to not significantly adversely affect the mechanical structures when removed.

11. The method of claim 9 wherein the sacrificial layer comprises photo resist.

12. The method of claim 9 wherein the sacrificial layer comprises silicon dioxide.

13. The method of claim 9 wherein the sacrificial layer comprises amorphous silicon.

14. The method of claim 9 wherein the gold is formed by a process selected from the group consisting of physical vapor deposition, sputtering, evaporation, plating, or chemical vapor deposition.

15. The method of claim 9 and further comprising bonding a cover to the bond ring.
16. The method of claim 15 wherein the cover is transparent.
17. The method of claim 15 wherein the cover is supported sufficiently above the mechanical structures to allow operation of such structures.
18. A microelectromechanical system (MEMS) device formed by a method comprising:
 - forming mechanical structures supported by a substrate and having a sacrificial layer encapsulating the mechanical structures;
 - forming a bond ring area laterally spaced from the mechanical structures, the bond ring area having a portion without the sacrificial layer thereon;
 - forming a layer of bond ring material over the sacrificial layer and the bond ring area;
 - removing some of the bond ring material to form a bond ring in the bond ring area; and
 - removing the sacrificial layer to release the mechanical structures.
19. The MEMS device of claim 18 wherein the method of forming it further comprises bonding a cover to the bond ring.
20. The MEMS device of claim 19 wherein the cover is transparent.
21. The MEMS device of claim 19 wherein the bond ring is annular in shape and surrounds the mechanical structures.
22. The MEMS device of claim 18 wherein the mechanical structure comprises a micro-mirror.

23. A microelectromechanical system (MEMS) device comprising:
a released mechanical structure supported by a substrate;
a bond pad area surrounding the mechanical structure and supported by the substrate;
a conductive bond ring formed on the bond pad area; and
a cover supported over the released mechanical structure by the bond ring, wherein the bond ring surrounds the released mechanical structure.
24. A display device comprising:
an array of microelectromechanical system (MEMS) devices, each device having:
a released mechanical structure supported by a substrate, wherein the mechanical structure comprises a micro-mirror;
a bond pad area surrounding the mechanical structure and supported by the substrate; and
a conductive bond ring formed on the bond pad area; and
a cover supported over the released mechanical structure by the bond ring, wherein the bond ring surrounds the released mechanical structure.